

Scope and Application

About COMcheck-EZ Materials

COMcheck-EZ™ is an optional way to demonstrate compliance with energy codes for commercial and high-rise residential buildings. It is applicable to most commercial buildings and high-rise residential buildings three stories or more above grade.

Use this version of COMcheck-EZ to demonstrate that your commercial or high-rise residential building design complies with codes based on the ASHRAE/IES Energy Code for Commercial and High-Rise Residential Buildings [ASHRAE 90.1 ('89) Code]. Other versions are available for the 1998 and 2000 International Energy Conservation Code and several state energy codes.

Residential buildings, townhouses, and garden apartments with three stories or fewer are covered under the Model Energy Code and residential chapters of the International Energy Conservation Code (IECC). REScheck, a companion product to COMcheck-EZ, is available to demonstrate compliance for low-rise residential buildings.

The COMcheck-EZ materials simplify and clarify energy code requirements. They have a different format than ASHRAE 90.1 ('89) Code, and redundant provisions and those having no impact on overall energy performance were deleted during COMcheck-EZ development. While COMcheck-EZ provisions may differ from those in the 90.1 ('89) Code, they are designed to result in equivalent overall energy efficiency. Therefore, buildings designed to conform with COMcheck-EZ can be deemed to comply with the 90.1 ('89) Code. However, COMcheck-EZ materials should be used only if approved by the building authority having jurisdiction.

COMcheck-EZ includes a manual method (prescriptive compliance path) and a software method (system performance compliance path). You can use either method to demonstrate that a proposed building design complies with the energy code requirements.

Only construction referenced in the building permit application must comply with the code requirements. Each system—envelope, mechanical, and lighting—can comply separately. For example, if the building permit application is for only the lighting system, then the envelope and mechanical provisions do not apply.

COMcheck-EZ can be used in conjunction with other compliance methods available under the code. For example, COMcheck-EZ can be used along with the ASHRAE 90.1 ('89) Code. Requirements can be mixed but not within major sections (envelope, mechanical, and lighting) unless separate permits are being requested for each system. For example, an applicant can apply for a shell permit using COMcheck-EZ to demonstrate envelope compliance. When requesting a permit for the mechanical system,

the applicant can show compliance using *COMcheck-EZ* or the ASHRAE 90.1 ('89) Code but cannot pick and choose mechanical requirements from either source.

This Scope and Application guide gives building design professionals and code enforcement officials an overview of the *COMcheck-EZ* materials and explains how the energy code requirements apply to a variety of commercial building situations.

You can access a U.S. Department of Energy Building Energy Codes Program (BECP) web site at <http://www.energycodes.gov> to learn about *COMcheck-EZ* and get free downloads of the complete package of materials. If you have questions about the materials, contact the BECP at techsupport@becp.pnl.gov.

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COMcheck-EZ Materials

The *COMcheck-EZ* materials include

- Scope and Application Guide
- Envelope Compliance Guide
- Mechanical Compliance Guide
 - Simple HVAC Systems
 - Complex HVAC Systems
 - Service Water Heating Systems
- Lighting Compliance Guide
- Software Compliance Guide
- State Maps and Prescriptive Packages
- Field Inspection Checklist

- Software CD-ROM

The *Envelope, Mechanical, and Lighting Compliance Guides* contain energy efficiency requirements. They provide direction in completing each compliance certificate used to demonstrate code compliance. These guides limit you to a prescriptive compliance path with no performance tradeoffs.

When performance tradeoffs and greater design flexibility are desired for one or more systems (envelope, mechanical, or lighting), the *COMcheck-EZ* software provides a performance path alternative for each system and generates a report used to demonstrate compliance.

For code enforcement officials, EZ tips for plan check and field inspection are included at the end of each compliance guide. The *Field Inspection Checklist* is useful when inspecting buildings for *COMcheck-EZ* compliance.

Envelope Compliance

The *Envelope Compliance Guide* contains energy efficiency requirements related to the building envelope. General requirements are included for limiting air leakage, certifying components, and installing vapor retarders. Climate-specific insulation and window requirements are provided in the prescriptive packages for each climate zone.

Mechanical Compliance

The *Mechanical Compliance Guide* contains energy efficiency requirements for heating, cooling, ventilating, and water heating. Included are requirements for heating and cooling system controls, outdoor-air ventilation, duct construction, service water-heating systems, and swimming pool heaters. This guide also contains instructions for trading off economizers with higher-efficiency cooling equipment.

Lighting Compliance

The *Lighting Compliance Guide* contains basic energy efficiency requirements for lighting systems. This guide identifies control, switching, and wiring requirements and types of exterior-lighting sources that comply. It also shows you how to demonstrate compliance with building- or area-specific interior-lighting power limits.

Software Compliance

The *Software Compliance Guide* provides instructions on obtaining, installing, and using the *COMcheck-EZ* software. The software is a highly flexible way to demonstrate compliance with minimal input. The software is designed to run on most Windows-based computers. The envelope portion allows roof, wall, window, floor, and skylight performance tradeoffs within the permit stage. The lighting portion allows you to quickly determine if your lighting design meets the interior-lighting power limits. The mechanical portion displays and prints a checklist of mechanical requirements based on descriptions of the HVAC systems, plants, and water-heating systems used in the building. The software automatically generates a report that can be affixed to project plans and submitted to code enforcement personnel to demonstrate compliance.

State Maps and Prescriptive Packages

The *Envelope and Mechanical Compliance Guides* contain requirements that vary with climate. Use the State Maps and Prescriptive Packages to identify the climate zone and

corresponding prescriptive package number for your proposed design used in determining climate-specific requirements.

Field Inspection Checklist

The *Field Inspection Checklist* helps ensure required energy efficiency measures are properly installed in the building in accordance with the building plans and specifications.

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Scope

You can use *COMcheck-EZ* to demonstrate energy code compliance in the design and construction of most types of commercial and high-rise residential buildings. However, you must use the *COMcheck-EZ* software method to demonstrate envelope compliance for buildings having a window-wall ratio (WWR) of more than 50%.

Applicable building types include

- offices
- retail, grocery, and wholesale stores
- restaurants
- assembly and conference areas
- industrial work buildings
- commercial or industrial warehouses
- schools and churches
- theaters
- apartment buildings and condominiums with four or more habitable stories
- hotels and motels

Code requirements do not apply to

- very low energy use buildings (i.e., peak energy usage less than 3.4 Btu per hour per square foot or 1 watt per square foot of floor area)
- buildings or portions of buildings that are neither heated nor cooled
- buildings designated as historic.

Applications

The following sections explain how *COMcheck-EZ* applies to a variety of typical building situations. While these examples can help illustrate various code applications, your local building department is the final authority on how the code applies to a project.

Unconditioned Spaces

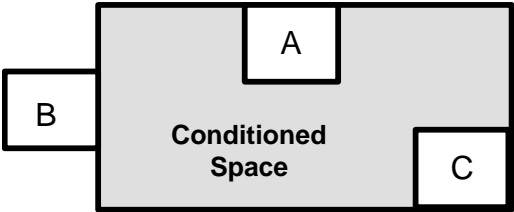
Unconditioned spaces are exempt from the envelope requirements of the code. Unconditioned spaces may contain limited heating or cooling equipment. This equipment must meet the mechanical provisions of the code. To determine if a space is conditioned, ask the following questions:

- Does the heating system capacity exceed 10 Btu per hour or the cooling system capacity exceed 5 Btu per hour per square foot of floor area?
- Is the conductance of heat from the space to adjacent conditioned space greater than to the outdoors?

If the answer is yes to either of the above questions, the space is conditioned, otherwise it is unconditioned.

A problem can occur when a building owner erects an unconditioned shell building and fails to comply with energy efficiency requirements. When a future tenant applies for a permit to install heating and cooling equipment, the building envelope must be brought into compliance, possibly requiring significant alterations. The lighting system, if installed in conjunction with the shell building, must also be brought into compliance in a similar situation.

Many code enforcement jurisdictions require that building owners sign an affidavit when applying for the initial building permit for a shell building. The owner acknowledges in the affidavit the potential difficulties associated with postponing envelope or lighting compliance. To minimize these difficulties, permit applicants should demonstrate compliance when each system is installed.

| Question |
|---|
| <p>The sketch below shows a one-story building with four different spaces. Spaces A, B, and C do not have installed heating or cooling equipment and are not controlled for human comfort. Are any of these spaces considered <i>unconditioned</i> and hence not subject to the envelope requirements of the code?</p>  |
| Answer |
| <p>The conductance of heat is based on the wall area and the amount of insulation in the walls. Space A is in contact with conditioned space on three sides. Space C is in contact with conditioned space on two sides. Space B is in contact with conditioned space on only one side. If we ignore the roof and assume that all of the walls shown have the same amount of insulation, the conductance of the walls between the conditioned space and space A is greater than the conductance of the walls in contact with the outdoors. Space A is considered conditioned space, and all requirements applicable to conditioned space apply. For Space B, the conductance of its wall adjacent to conditioned space is less than the conductance of walls in contact with outdoors, so B is considered unconditioned. For Space C, the conductances are equal, so C is also considered unconditioned.</p> |

Newly Conditioned Spaces

When an unconditioned space becomes conditioned, the space is considered an addition. All envelope, lighting, and mechanical systems and components associated with the addition must comply with the energy code requirements as if the addition were a new building.

New Construction in Existing Buildings

Tenant improvements in an existing building (the base building has been constructed, but the individual tenant spaces have not been completed) are considered new construction. All envelope, lighting, and mechanical systems and components being installed must comply with some or all of the energy code requirements.

Existing systems and components not subject to the current permit application must comply with the energy code requirements only when conditioning previously unconditioned space.

Changes in Occupancy

Generally, if a change in occupancy does not include physical changes to the building and does not result in an increase in energy use, energy code requirements do not apply. If the occupancy change would result in increased demand for energy, compliance with the energy code (or approval by the code authority having jurisdiction) is required. Your code enforcement official may need to evaluate these changes on a case-by-case basis to determine which code requirements apply.

Alterations to Existing Conditioned Spaces

Alterations to existing conditioned spaces must comply with the following criteria:

- New systems in any alteration must comply with the energy code requirements.
- Altered components of existing systems must comply with the energy code requirements; unchanged components do not have to comply.
- If an alteration is made to an existing system and the resulting system does not comply, all altered components must comply, and the altered systems must use no more energy than before the alteration.

Determining how to apply these alteration requirements can be confusing, particularly with existing building envelope and lighting systems where some requirements apply at the system level. Just remember that each altered component (e.g., window or lighting fixture) must comply, and, if the entire building envelope or building lighting system is not being brought into compliance, the alteration cannot result in greater energy use.

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| Question |
| A building owner wants to install a new window in an old building, which will increase the glazing area in a building that already does not comply with building envelope requirements in the code. What requirements must be met to demonstrate compliance for this alteration? |
| Answer |
| The new window will increase building energy use even though the new window complies with code requirements; e.g., for U-factor. Therefore, the increased glazing area must be offset with other envelope improvements. You can use the <i>COMcheck-EZ</i> software to identify an alteration, such as adding insulation that will offset the added glazing. This is done by showing that the envelope compliance index is no worse with the new glazing and insulation than it was without the alterations. |

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| Question |
| A building owner wants to rearrange some interior partitions and reposition the light fixtures in the affected rooms. Do any requirements apply to this alteration? |
| Answer |
| Because the alteration does not change the connected lighting load, the lighting system will use no more energy than before, so the overall lighting system does not need to comply. Only the control, switching, and wiring requirements apply. In this example, each newly arranged room must have a light switch, and any one- or three-lamp ballast must be tandem-wired. |

Additions

Additions are newly constructed conditioned spaces or previously unconditioned spaces after heating or cooling equipment has been installed. All additions that are not exempted under the code must comply with the energy code requirements.

Envelope, lighting, and mechanical systems and components in additions are treated the same as they are for new buildings. Existing systems whose services are simply extended into an addition do not have to meet current code requirements, although the code does apply to new components of the system in the addition.

For additions, you can use two options to demonstrate compliance:

1. Treat the addition as a stand-alone building, ignoring the common walls between the existing building and the addition, and show compliance for only the addition. You can use either the *COMcheck-EZ* manual or software method to demonstrate compliance using this option.
2. Treat the existing building and the addition as a single building. In this case, the addition must not increase annual energy costs for the combined building (existing plus addition) beyond those for the existing building (in its pre-existing condition) with an otherwise identical addition whose components and window-wall ratio do comply with the code. This option provides greater design flexibility as improvements to the existing building can be used to offset noncompliant features in the addition.

However, we recommend that you consult with the building department before using this option to verify their acceptance of the compliance

method. In addition, this option is not supported by the current *COMcheck-EZ* materials.

Buildings with Multiple-Occupancy Types

The energy code addresses buildings with multiple-occupancy types as follows:

- **Minor Occupancy** - If an occupancy type takes up less than 10 percent of a building's conditioned floor area, then the area devoted to that occupancy type must meet the same requirements as the major-occupancy type.
- **Multiple and Single Occupancy** - The same compliance process is used for commercial buildings with multiple-occupancy types as for those with a single-occupancy type. The *COMcheck-EZ* manual and software methods allow you to specify multiple-occupancy types.
- **Mixed Residential and Commercial Occupancy** - This occupancy type occurs when a building has three or fewer stories and contains both residential and commercial occupants, with the minor-occupancy type taking up more than 10 percent of the building's conditioned floor area. The residential and commercial occupancies are considered separately because they fall under two different scopes. Thus, two compliance submittals must be prepared using the appropriate calculations and forms from the respective codes for each type. Mixed residential and commercial buildings having more than three stories must comply as commercial buildings, regardless of the number of stories that are classified as residential occupancy.